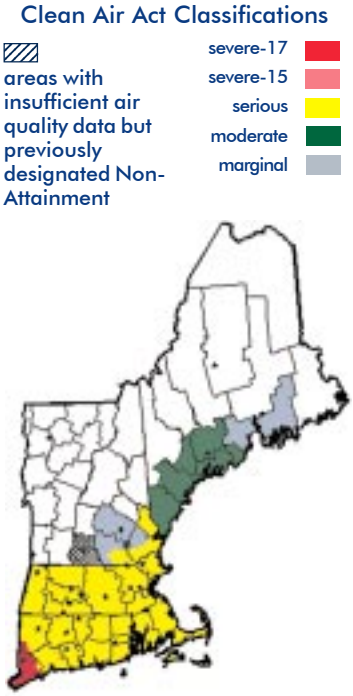
Public Health

"What is the color of wind?"
—Zen Koan

Figure 1
Reductions in Non-Attainment* Areas for the One-Hour Ozone Standard



1990 Non-Attainment* Areas

1999 Non-Attainment* Areas

*not meeting standards
source: EPA-New England

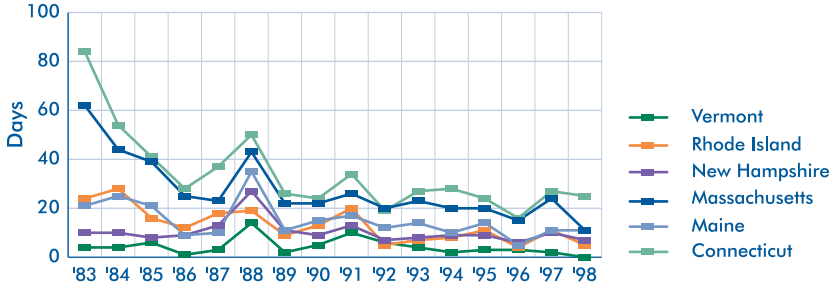
Over the past two decades, New England has made tremendous progress in improving its air and water quality; however, there is still much work to be done. Our greatest challenges are to achieve healthy air throughout New England, address toxic pollution problems such as mercury and other persistent toxic chemicals, clean up polluted areas, and target pollution prevention efforts that support our region's most important renewable resources and protect the health of all our residents.

Getting the Better of Ozone

When the Clean Air Act Amendments were signed in 1990, large areas in New England did not meet EPA's ambient air quality standard for ground-level ozone. At that time, the ozone standard was set at 0.12 parts per million (ppm) based on a one-hour average. Since then, there has been improvement in ozone levels throughout the region. Currently, the entire states of Vermont, Maine, New Hampshire, and Rhode Island—and portions of eastern Massachusetts—have air quality that is better than the one-hour ozone standard (**Figure 1**).

Two years ago, EPA announced a new national ambient air quality standard for ground-level ozone to safeguard the public against longer periods of ozone exposure. Ozone has been shown to cause inflammation and irritation of the respiratory tract, increasing respiratory infections and sensitivity to allergens. The new eight-hour standard is set at 0.08 ppm, averaged over an eight-hour period. During the 1998 ozone season (April through September), there were twenty-eight days when one or more ozone monitors in New England recorded levels above the eight-hour standard. Although the number of days in which ozone is over the limit varies from year to year due to climate conditions, there has been an overall downward trend in ozone levels in the New England states (**Figure 2**). This welcome improvement is a direct result of emission controls,

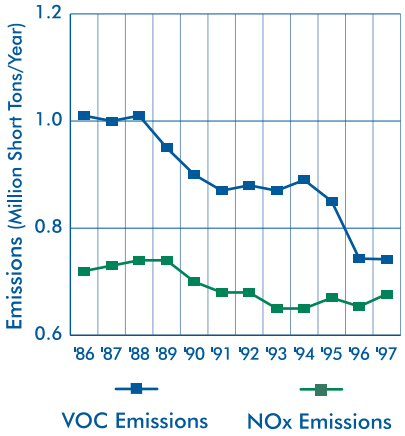
Figure 2
Unhealthy Days - Number of Days in New England Worse than the Eight-Hour Ozone Standard



source: EPA-New England

especially cleaner cars and cleaner-burning gasoline, and controls on industries that emit volatile organic compounds (VOCs) or nitrogen oxides (NOx) **(Figure 3)**. Future efforts, including EPA rules to limit NOx transport, should make levels fall even further.

Figure 3
Decreasing VOC and NOx Emissions in New England



source: EPA AIRS/NARIP

Dust in the Wind

High levels of exposure to particulate matter (PM) are known to increase the frequency of bronchitis, asthma attacks, and respiratory infections. Particulate matter is also correlated with increased mortality in the elderly, and has been linked to the development of cancer. A direct environmental impact of PM is reduced visibility. In 1997, EPA promulgated a new standard for particulate matter, covering PM 2.5—fine airborne particulate matter less than 2.5 microns in diameter. Previously, the standard was based on particles less than 10 microns in diameter (PM10). Over the next two years, EPA and the states will be establishing a National PM 2.5 Air Monitoring Network in New England consisting of nearly one hundred particulate monitors. In 1999, 67 PM 2.5 monitoring stations will be operating throughout New England **(Figure 4)**. Data from these monitors will be used to measure trends and prioritize enforcement approaches, design control strategies, and undertake further research to better understand the complex nature and transport of fine particles in the region.

During 1998, the Connecticut DEP conducted a preliminary monitoring study in Westport, Bridgeport, and New Haven to obtain advanced PM 2.5 data and gain experience with the new monitoring equipment. Preliminary study results show that air quality for the neighborhoods represented by these sites was significantly better than the new daily (24-hour) standard, but barely better than the annual standard. EPA is already taking many steps to reduce public health risks from fine particulate matter through particulate emission reduction from stationary and mobile sources. One local example is a program to rebuild and retrofit buses used for public transportation in urban areas such as Boston, Hartford, New Haven, and Providence. EPA certification of the equipment used to modernize urban buses will ensure that the program will lower ambient levels of particulates in the air of our major cities.

Figure 4
1999 Regional PM 2.5 Monitoring Stations

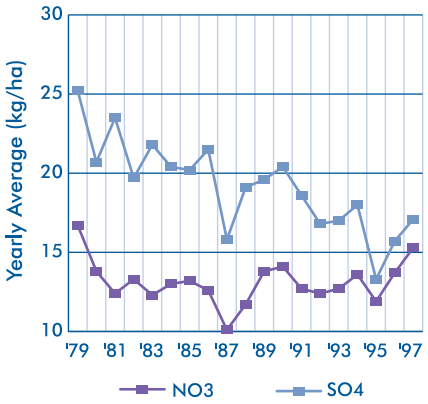
source: EPA-New England

Nitrogen Oxides: Less Pollution from Upwind

Last fall, to reduce the transport of ozone and ozone precursors across the eastern United States, EPA required twenty-two states and the District of Columbia to submit state implementation plans (SIPs) to reduce emission of nitrogen oxides (NOx), a major source of ground-level ozone in our environment. These requirements will significantly lower the amount of NOx transported into New England from Midwestern states, and should help dramatically reduce the amount of ground-level ozone in our region.

Most reductions will be made by Midwestern states. In New England, Connecticut, Massachusetts, and Rhode Island are required to develop NOx reduction plans under this program. Reducing NOx emissions from electric generating stations and large

Figure 5
Nitrate and Sulfate Trends in New England Rain and Snow



source: National Atmospheric Deposition Program

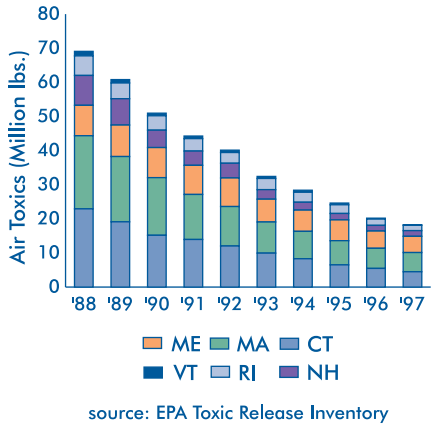
industrial stationary sources is expected to be the most cost-effective way to meet these requirements. EPA guidelines encourage the states to allow the trading of NOx emission credits between facilities; these guidelines mesh with the regional NOx trading program for the Northeast already developed by the Ozone Transport Commission, a commission established by the Clean Air Act of 1990 to coordinate regional efforts to address ozone in the Northeast. Trading emissions credits will allow the reductions to be made with the least overall economic cost.

Lowering NOx emissions will also help to reduce other environmental damage associated with air pollution. NOx emissions contribute as much as one-third of the total nitrogen loadings to estuaries and bays, accelerating eutrophication—the over-enrichment of aquatic ecosystems that causes oxygen depletion, die-back of underwater plants, and reduced populations of fish and shellfish. Nitrogen oxides also contribute to airborne particulate matter; regional haze (visibility) problems; global warming; acid rain; and acidification of lakes, streams, and soils **(Figure 5)**.

Attacking Air Toxics

Since 1988, there has been a 73.6% decline in toxic air releases from manufacturers in New England. Toxic air pollutants are those that are known to cause cancer or other serious human health effects. The degree to which a toxic air pollutant affects an individual's health depends on many factors, including the quantity, duration, and frequency of exposure, the toxicity of the chemical, and the individual's personal susceptibility. The 1990 Clean Air Act Amendments list 188 toxic air pollutants that EPA is required to control, with standards for specific types of industries. As a result of this approach, EPA has successfully regulated 49 industrial categories and 155 toxic air pollutants. EPA estimates that the standards issued to date will result in the reduction of approximately one million tons of hazardous air pollutants nationwide. The Toxic Release Inventory (TRI) data show that major manufacturers reduced releases of air toxics by 25,400 tons between 1988 and 1997. This reduction was the result of a combination of government programs and industry initiatives, including emission controls for ozone and other pollution prevention efforts **(Figure 6)**.

Figure 6
Air Toxic Emissions are Decreasing



source: EPA Toxic Release Inventory

Air and Gasoline: Getting Better All the Time

Lead was taken out of gasoline starting in the 1970s and no longer poses a public health threat in fuels. However, many of the one hundred or more compounds that still remain in gasoline are toxic. When we refuel and drive our vehicles, small quantities of these toxic compounds are released into the atmosphere. Reformulated gasoline, which became available in early 1995, resulted in a significant reduction in the concentration of a number of toxic organic compounds, especially benzene, toluene and xylene. These compounds have serious immediate and long-term effects on human health, ranging from narcosis, nausea, and headaches, to severe blood disorders and leukemia. Since 1995, the concentration of these compounds has continued to decrease with a

29% reduction in xylene, a 16% reduction in toluene, and a 34% reduction in benzene. The control program has had a dramatic and positive effect on cleaning the air in New England. Additional reductions in the concentration of toxic compounds in gasoline are mandated for the year 2000, and should result in even lower concentrations of toxic organic compounds in our air. Although our gasoline is improving, it remains a very toxic substance.

MTBE: Balancing The Benefits

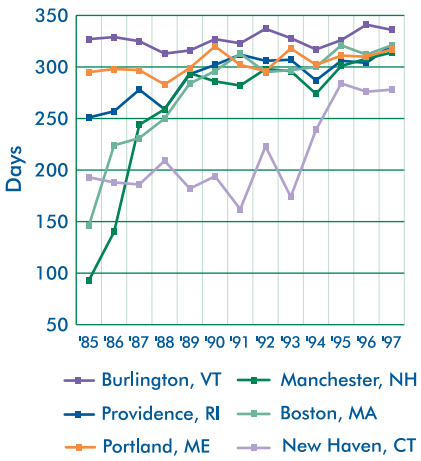
MTBE (methyl tertiary butyl ether) is a compound used in reformulated gasoline as part of the successful strategy described above to reduce toxic chemical and hydrocarbon emissions from gasoline. MTBE, however, creates an unpleasant taste and smell in drinking water even at low levels, and is a possible human carcinogen. In addition, MTBE is very soluble in water, so even small gasoline spills can put MTBE into groundwater, and then into drinking water obtained from wells. When the state of Maine discovered MTBE in many of its wells in the fall of 1998, Governor Angus King asked EPA to allow the state to stop using MTBE in its gasoline. EPA-New England agreed to let Maine "opt-out" of the MTBE requirement, provided that the state can work with EPA to find alternatives that offer the same air quality benefits as gasoline with MTBE. In November 1998, EPA commissioned the Clean Air Act Advisory Committee Panel on Oxygenate Use in Gasoline to study the potential health effects and risks of MTBE, while working hard to find alternate ways of reducing air toxics and ozone.

Lines of Defense: Protecting the Water We Drink

Protection of public drinking water supplies from contamination by microbes was a major theme of the recent reauthorization of the Safe Drinking Water Act. Over the past year, EPA-New England has begun implementing many of the provisions set forth in the Act by promoting an integrated, "multiple-barrier" approach to the protection of drinking water quality. Multiple-barrier protection is a combination of source water protection, filtration, chemical disinfection and distribution system safeguards that protect drinking water quality even if one of the barriers fails. EPA-New England has provided $6.3 million in funding to the New England states under the Source Water Assessment Program to assess the threats to every public source of drinking water. EPA has also given $63 million for states to fund improvements in drinking water treatment systems.

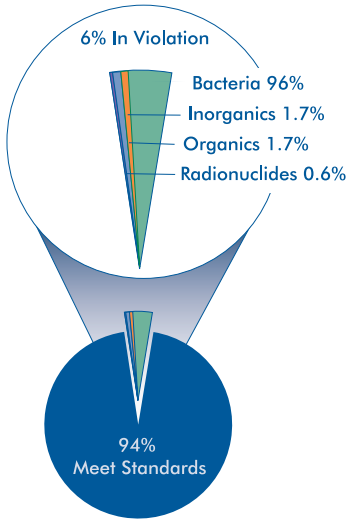
The Safe Drinking Water Act requires water suppliers to deliver Consumer Confidence Reports starting in 1999. These reports are designed to respond to the public's right to know by educating consumers about the source and quality of their drinking water. The reports provide a framework within which consumers can obtain information about their drinking water, including the source water, contaminants detected, health effects of contaminants when violations occurred, potential sources of detected contaminants, and availability of source water assessments.

Figure 7
Historical Trends in Healthy* Air Quality Days



(Based on County-wide Air Quality)
*Air pollutant levels lower than 50% of the air quality standards
source: EPA AIRS

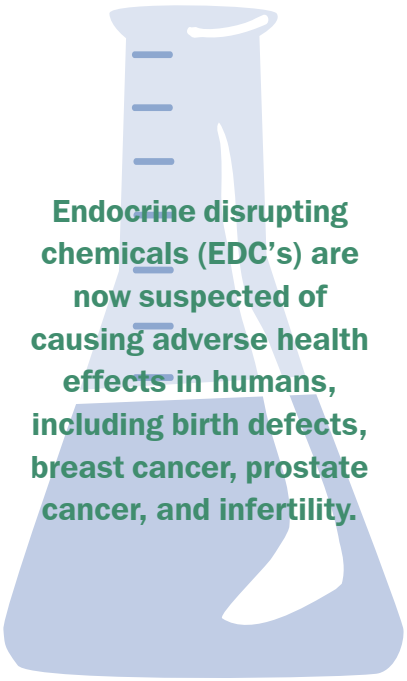
Figure 8
Public Water Systems Meeting Drinking Water Quality Standards



source: EPA Safe Drinking Water Information System, 1998

New Chemical Testing

Endocrine disrupting chemicals (EDCs) are a category of substances that mimic natural hormones in the body. These chemicals are used in thousands of common products, ranging from pesticides to plastics. They have been shown to cause developmental and reproductive abnormalities in wildlife, and are suspected of causing adverse birth defects, breast cancer, prostate cancer, and infertility in humans. Concern is growing about the presence of EDCs in food, water, and the environment. EPA is instituting a screening program to evaluate the health and environmental effects of 15,000 chemicals, each of which is produced in annual volumes exceeding 10,000 pounds. Chemicals that test positive will be subject to a series of additional tests, including specific tests to determine their reproductive, developmental, and behavioral effects. The program will also determine the effects of endocrine disrupters on ecological systems and wildlife and test combinations of chemicals. As our knowledge grows, we will be able to determine appropriate actions to deal with this potential threat. Additional information on this topic can be found on EPA's website (http://www.epa.gov/opptintr/opptendo).



Endocrine disrupting chemicals (EDC's) are now suspected of causing adverse health effects in humans, including birth defects, breast cancer, prostate cancer, and infertility.

The Problem with Mercury

At first glance, mercury is an attractive substance: shiny and slippery, it easily breaks apart and then recombines almost magically. It is a naturally occurring element that moves through the environment as a result of both natural and human activities. Unfortunately, it is also a dangerous and persistent toxic contaminant that accumulates in living tissues, a process known as bioaccumulation. Most of the mercury that contaminates our New England landscape is from air emissions that are subsequently deposited on land and in fresh water. The primary sources are incinerators and fossil fuel combustion facilities, both local and outside the region.

The primary source of mercury exposure in people is through the consumption of freshwater fish contaminated with methyl mercury. All of the New England states have issued fish advisories about how much and how often to eat locally caught freshwater fish. The typical New England consumer eating fish from restaurants or grocery stores is not in danger of consuming harmful levels of mercury, but individuals who depend on freshwater fish as a main part of their diet may be at risk. More information on fish and wildlife advisories can be found on EPA's website (http://www.epa.gov/ost/fish).

Historical data for the Lake Champlain Basin show that mercury pollution from rain and snow varies seasonally, with the greatest amount of mercury deposited from late spring through the fall. Lesser amounts of mercury are reported for the winter months. The amount of mercury in rain and snow measured at this site, located on the west face of Mount Mansfield, is enough to contaminate fish-eating predators, such as smallmouth bass, walleye, loons, and kingfishers. The pattern and amount of mercury deposition at this site are typical of other sites in New England.

EPA is implementing a host of regulatory control programs to reduce the emissions of mercury from municipal waste incinerators—the largest source of mercury emissions in the northeast—and other sources such as medical waste incinerators. It is expected that over the next three years these programs will result in a 90% decrease in mercury emissions from 1995 levels. EPA-New England has worked with all of the states in the region to develop additional strategies for reducing mercury emissions, including adoption of even more stringent controls of emissions, reduction of mercury in consumer products, and the virtual elimination of mercury emissions from hospitals. In addition, we have been a leader in monitoring mercury deposition, supporting a network of mercury monitoring stations throughout the region.

The Providence Initiative for Public Health

EPA's Urban Environmental Initiative (UEI) focuses on the unique environmental threats in urban areas. In Providence, Rhode Island, resources are concentrated on three fundamental environmental and public health issues facing local residents: prevention of lead poisoning, urban rivers and wetlands, and vacant lots. The Safe Housing Lead Task Force is developing a follow-up strategy to its report on lead poisoning prevention and lead-safe housing. A public campaign is underway to educate local residents about appropriate use of the Woonasquatucket and Blackstone Rivers, which recently achieved National American Heritage River designation. Finally, EPA is sampling soil for lead contamination on target urban vacant lots and working with community organizations, the Department of Planning, and local residents to transfer these lots to local residents at the cost of only $1.00. In exchange for the reduced cost, residents have agreed to restore, revitalize, and maintain the lot in cooperation with the Providence Redevelopment Agency. UEI funds were also used to clean and remove illegally dumped materials from over 200 vacant city lots.

EPA is sampling soil for lead contamination on target urban vacant lots and working with community organizations, the Department of Planning, and local residents to transfer these lots to local residents at the cost of only $1.00

Mercury At Home

Mercury is likely to be found in your home in thermometers, barometers, fluorescent lights, thermostats, and some types of switches. Whenever possible, it is a good idea to convert to a non-mercury containing product, such as an electric thermometer. Some states collect products containing mercury (e.g., unbroken fluorescent lamps) as part of their household hazardous waste collection program. Even small mercury spills must be properly cleaned up. Never use a vacuum, shop vac, or broom to clean up spilled mercury—a vacuum will spread the mercury in the air; a broom will spread it out and make it harder to collect. If a thermometer breaks on a smooth surface, use two stiff pieces of paper to scoop up all the beads into a sealable plastic container. If necessary, use an eye dropper to capture all the beads, then wipe the area with a damp sponge. All the clean up materials used (paper, dropper, sponge) and the contaminated portion of any rug or carpet should be placed in marked plastic containers and taken to a local mercury recycling site. If you have a larger spill, contact your local health department for the best cleanup method.

Photo: Skip Lisle-Penobscot Nation

Beaver Deceiver

The Penobscot Beaver Deceiver is a protective fencing that is constructed and used to protect culverts and adjacent roads from being dammed. This device has resulted in a savings of hundreds of thousands of dollars to the tribes, as well as assuring the protection of these streams and rivers.

List of Tribal Governments

Tribal Governments:

- Aroostook Band of Micmac Indians
- Houlton Band of Maliseet Indians
- Passamaquoddy Tribe, Indian Township
- Passamaquoddy Tribe, Pleasant Point
- Penobscot Nation
- Wampanoag Tribe of Gay Head (Aquinnah)
- Narragansett Indian Tribe
- Mashantucket Pequot Tribal Nation
- Mohegan Tribe

Indian Country

EPA-New England's fundamental goal in working with New England's Native American tribes is to assist them in protecting tribal members' health and maintaining and restoring the natural integrity of their ancestral lands. Our major emphasis is close involvement with tribal governments in making environmental policy and management decisions. The first Tribal Agreement in New England was signed with the Houlton Band of Maliseet at a ceremony in December 1997. EPA-New England now has agreements with three of nine tribes, with another four expected soon. Direct electronic linkages have been instituted to expedite communication between tribes and EPA-New England staff. EPA and other federal partners are working with the Narragansett and Penobscot Nations to provide environmental data about tribal lands. The tribes received grants to establish programs and purchase equipment to map their lands, boundaries, and monitoring sites and will be a part of the New England air pollution monitoring network, which tracks particulate matter, mercury, ozone, and acid rain. This data may then be compared with New England's state air monitoring data to better understand the nature and transport of air pollution within Indian Country. Information and data from the Passamaquoddy cadmium study of livers and kidneys from moose and deer will be added to the network.

An example of another collaborative project between EPA and the tribes is Little Moccasins, which developed a lead poisoning prevention manual for tribal day care centers, clinics, and families and provides information about screening, healthy diet, and basic preventive steps, along with regulations and resources about lead poisoning. The Penobscot Beaver Deceiver, a protective fencing that is used to protect culverts and adjacent roads from being dammed, is being transferred to other Tribes across the U.S. The Mohegan Tribe is a leader in Indian Country in pollution prevention, mandating pollution prevention training for all employees and implementing one of the most comprehensive programs in the nation.

EMPACT: Your Right To Know

The EMPACT (Environmental Monitoring for Public Access and Community Tracking) program is a result of President Clinton's right-to-know initiative. EMPACT's goal is to use the latest technology to bring individuals and communities environmental information they can understand and use every day. Almost all of the following projects use Web sites, public displays, and other innovative methods of bringing information to the public. EPA-New England has brought over $5 million in EMPACT funds to the region (out of a total of $37 million split among all ten regions and all of EPA Headquarters offices). The projects in New England include the following:

Other EMPACT Projects on the Boston Harbor/Charles River and the SUNWISE/Boston program are highlighted in the Stewardship and Children's Health sections of this report, respectively.

Marine Environmental Monitoring Network, Long Island Sound, CT

Sensors located on a buoy in Long Island Sound provide continuous real-time monitoring of water quality and the health of this important estuary. The project tests new techniques for measuring phytoplankton productivity and detecting hydrocarbons and pathogenic bacteria.

Air Quality Information, Portland, ME

EPA-New England is working in partnership with Maine's Department of Environmental Protection to establish an ambient air pollution monitor in the City of Portland to measure the concentrations of eight different air contaminants. The Portland area exceeds ozone standards (maximum daily ozone value exceeded 150 ppb in 1997) and contains a diverse mixture of air pollution sources including petroleum product tank farms, a large pulp mill, significant emissions from traffic, and a number of small manufacturing facilities that contribute to ozone formation.

Sustaining Burlington, VT

Burlington, Vermont has made a commitment to become the most environmentally sustainable city in the nation. The EMPACT grant funds a program that includes an extensive public involvement process to inform local communities about collection, processing, and dissemination of data. In addition to web sites and other displays, an Eco-Detectives Club trains children and adults to collect and document information on local plants and animals and make this information available to the public.

Air Quality, Roxbury, MA

In 1992, the asthma hospitalization rate in Roxbury (a neighborhood of Boston, MA) was the highest in Massachusetts. The area has more than fifteen bus and truck depots, with more than 1,150 diesel vehicles within a mile and a half of Dudley Square in central Roxbury. The Roxbury EMPACT project measures eight air quality indicators. The air quality data, along with the training needed to interpret it, give residents who are most sensitive to air pollution–children, the elderly, and those who are already sick–the information they need to make better health choices every day.

Lead Abatement Project, Boston, MA

In partnership with Boston University School of Public Health, Dept. of Environmental Health and the Bowdoin Street Health Center, EPA-New England is working on this door-to-door sampling project in the Dorchester/Roxbury community of Boston with local high-school students to teach them lead-testing and landscaping techniques. Their knowledge is put to work to analyze lead content in soil from neighborhood lots, teach about the dangers of lead exposure, and provide low-cost approaches to cleaning up lead contamination in yards through landscaping techniques. The project reduces lead exposure in the neighborhoods, provides training to local youths, and serves as a model for other inner-city communities as a self-sustaining lead exposure reduction program.

Photo: Juliet Stone

Local youths participating in Dorchester/Roxbury Lead Abatement Project